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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VIDA, MELANIE M

ART UNIT PAPER NUMBER

2697

DATE MAILED: 01/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/339,959

Applicant(s)

KAKUTANI, TOSHIAKI

Examiner

Melanie M Vida

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 6/25/99.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 June 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,6,9-11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements (IDS) submitted on 9/24/99, 9/27/99, 2/28/00, 5/30/02, and 9/16/02 has been considered by the examiner and is attached to this office action.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

The control circuit, 40, is not illustrated in *Figure 10*. It appears that the applicant should label the dotted box as the control circuit containing the items mentioned in the disclosure (page 16, lines 5-10). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The computer, 90, is not illustrated in *Figure 10*. It appears that the applicant should label the arrow going towards the PC interface, 44, as the computer, 90 (page 16, lines 6-7). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

In *figure 11*, the distributor, item 55, is not illustrated as disclosed in the specification (page 16, lines 20-28). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: In *figure 10*, a block labeled 39 is not disclosed in the specification (page 16). A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

Claims 9, 13, and 15 recite the limitation “plurality of threshold values” in pg. 30, line 17, pg. 32, line 13, and pg. 33, line 13, respectively. There is insufficient antecedent basis for this limitation in the claim.

5. **Claim 5** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the claimed difference between the threshold values having a plurality of “turning values”. After reading pg. 5, lines 19-26 and pg. 20, referring over to figure 14, it is still unclear.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-8, 12, and 14 are rejected under 35 U.S.C. 102(b) as being unpatentable by Toshiaki Suwa-shi et al., EP 0820187 A2.

Claim 1 is disclosed in Toshiaki et al., specification as follows: Toshiaki's discloses at least two embodiments, which teach of a printing system in which a plurality of dots of different densities are formed by discharging ink of a specific density (pg. 19, lines 3-6), (1st embodiment, pg. 13, line 12 through pg. 14, line 56), (2nd embodiment, pg. 14, line 57 – pg. 18, line 19). A print head, item 28, figure 2 used for ink discharge is disclosed by Toshiaki (pg. 8, lines 46-47). In Toshiaki's first embodiment, a light cyan ink, (fig. 18, C2), and a regular cyan ink (fig. 18, C1), read as N dots of P dots with different densities, is disclosed (fig. 4, color heads 61-66 and print head 28). Further, Toshiaki has disclosed a rasterizer, read as an input unit original (pg. 9, lines 44-47), (fig. 25, item 84, and item 12), which converts image information from a computer application to dot-based color information, read as tone data for each pixel in an (pg. 18, lines 36-47).

Referring to **claim 1**, Toshiaki's inherently teaches a memory means for storing a plurality of threshold values as evidenced by his illustration of a computer in figure 25 comprised of the ROM, RAM memory components, and his disclosure of a method in which a plurality of

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threshold values comprise a matrix Dref1 for determining a deep level dot, and a matrix Dref2 for determining a light level dot (page 11, lines 26-40). Toshiaki's discloses an image display apparatus which can form or non-form, read as on/off states, multi-tone dots, read as a multi-tone unit, for at least two types of dots having different hues (page 19, lines 10-22). Further Toshiaki discloses an error diffusion step after determining the on/off state of deep and low level dots, for obtaining the density of the data, where the error is the difference between the calculated value RV, read as the density to be expressed by a dot, and the corrected value DC, read as the density of the dot actually expressed (page 12, lines 36-47). Toshiaki illustrates in fig. 18, a number of dots per unit area corresponding to light cyan, C2, and a cyan dot, C1, read as a dot creation unit, which corresponds to P of N possible dots having different density per unit area (page 12, lines 51-54).

Referring to **claim 2**, Toshiaki teaches that a formation or a non-formation of dots with either a high-density or a low-density ink, read as P of N different dots, are compared with threshold values (fig. 17), to prevent unnatural step-edges in an image, read as a creation ratio (page 12, lines 32-35, and page 13, lines 5-11).

In regards to **claim 3**, Toshiaki's figure 13 illustrates a graph depicting a dot recording ratio (0-100%), read as the creation ratio (fig. 13), (page 10, lines 44-57), (page 10, lines 17-25).

In regards to **claim 4**, Toshiaki's figure 13 inherently illustrates at least two of the corresponding threshold values set to an identical value in a specified input tone range as evidenced by a figure 13, wherein a point lying in the input tone range, 127-191, has substantially the same dot-recording ratio value, wherein both a light-ink C2, and deep-ink, C1, dot is rendered (fig. 13).

With regards to **claim 5**, as best understood from the language of the claim, Toshiaki inherently teaches that the difference between corresponding threshold values has a plurality of turning values according to the input tone value as evidenced by the illustration in figure 14, in which a 4x4 matrix of threshold values in the range of one to sixteen corresponds to a plurality of values in the input tone ranging from one to fourteen to create on/off states of deep dots (fig. 14), (page 11, lines 32-40).

With regards to **claim 6**, Toshiaki illustrates in fig. 24 (2nd embodiment), that a larger threshold, EdTh1 and a smaller threshold EdTh2 are used for the determination among three different dots (pg. 16, lines 17-20).

Toshiaki's figure 13 illustrates **claim 7**, where the dot recording ratio of light ink, C2 and deep ink, C1, have a continuous range, 0-100%, corresponding to a continuous input tone data range, 0-255 (fig. 13).

By discussing the converse of **claim 8** in which the threshold values vary with the corrected data DC, Toshiaki implicitly teaches that the creation ratio, read as the dot recording ratio, (fig. 13) in a lower limit of the continuous tone range is set to be different from a specific tone value, at which the creation ratio of P of N different dots abruptly changes when the corresponding threshold values are set to a fixed values irrespective of the one value (pg. 12, lines 29-35).

With regards to **claim 12, and 14**, please refer to the likes of claim 1.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9-11, 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toshiaki et al. EP Patent No. 820187 A2 as applied to claims 1-8, 12 and 14 above, and further in view of Shiau et al. U.S. Patent No. 5,880,857 and further in view of well-known prior-art (MPEP 2144.03).

With reference to **claim 9**, Toshiaki discloses a printer-system with print methods encompassing all that disclosed in claim 1. Toshiaki does not expressly disclose a noise addition unit. Shiau illustrates a perturbation of noise in an image signal and a threshold in fig. 7. That is, he discloses a random generator circuit, read as the noise addition unit in fig. 6, consisting of a random noise generator and a noise lookup table (Shiau, col. 5, lines 11-54). The noise lookup table is read as a preset noise value. Finally, this noise is added to a threshold value and an image signal, (fig. 8, S21, and fig. 9, S22, respectively), (col. 6, lines 7-33), prior to modifying a multi-level gray signal, read as a multi-tone unit. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the printer-system and methods disclosed by Toshiaki with a noise addition unit as disclosed by Shiau. One of ordinary skill in

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the art would have been motivated to do this in order to prevent error diffusion pattern shifting in image data (Shiau, col. 1, lines 9-15).

Toshiaki in view of Shiau does not disclose that the noise generator adds noise to a plurality of threshold values.

The examiner takes Official Notice of the fact that it is well known in the art to use matrix math rather than a single value for implementing image algorithms with thresholds. At the time this invention was made, it would have been obvious to a person of ordinary skill in the art to add noise to a plurality of threshold values for Toshiaki in view of Shiau.

One of ordinary skill in the art would have been motivated to do this in order to reduce algorithm computational complexity and increase algorithm efficiency.

Regarding **claim 10**, Toshiaki in view of well-known prior-art shows all the features of the claimed invention, except for the noise addition unit wherein a preset noise data is added to either the input tone data or a part of the plurality of threshold values, prior to the function of a multi-valuing unit.

Shiau teaches of a noise generator comprised of a random number generator and a noise lookup table, read as preset noise, which adds noise to either the input tone value or the threshold value if the tone data is greater or equal to the values [$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$], read as the predetermined tone (Shiau, fig. 7, S1, & S2) prior to modifying a multi-level gray signal, read as a multi-valuing unit.

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At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to implement Shiau's, S1 and S2 in fig. 7, read as the noise addition unit with Toshiaki's printer method and apparatus in further in view of well-known prior-art.

One of ordinary skill in the art would have been motivated to do this in order to prevent artifacts caused by error diffusion a method comprising the multi-tone unit (Shiau, col. 1, lines 9-15).

In reference to **claim 11**, Toshiaki in view of well-known prior art and further in view of Shiau does not disclose a first noise data and a second noise data, wherein the second noise is greater than the first noise data. Further, the former noise is added to at least one of a plurality of threshold values and a input tone value only if the input tone data coincides with a predetermined tone value, and the latter noise is added to at least one of a plurality of threshold values and an input tone value prior to a multi-toning.

Shiau discloses that noise added to at least one of the input tone signal and a threshold value, which depends on whether the input tone signal corresponds to $[1/3 \ 1/2, \ 1/4]$, read as a predetermined tone value. Shiau teaches that a pre-determined and different noise perturbations are added depending on the threshold/signal relationship (col. 6, lines 60 – 67 through col. 7, lines 1-5).

The examiner takes Official Notice that it is well known in the art to vary the threshold magnitude to modulate the noise perturbation to a image input signal towards preventing image artifacts.

It would have been obvious to one of ordinary skill in the art at the time the invention was made, to combine the steps of Shiau for modulating a specific amount of noise to the

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threshold or image signal values as a first or second noise, where the former is less than the latter based on a comparison of the image input signal with a predetermined tone pattern.

One of ordinary skill in the art would have been motivated to do this in order to more effectively prevent artifacts in an image caused by an error diffusion step in the multi-toning unit.

With regards to **Claims 13 and 15**, please refer to the likes of claim 9.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Beardsley et al, U.S. Patent No. 5,648,801 a grayscale printing apparatus with method to generate multi-size ink spots.

Eschback, U.S. Patent No. 5,045,952 error diffusion with threshold modifier block of an input image for multilevel output.

Tsuji, U.S. Patent No. 5,077,615, error-scatter with multi-tone conversion method.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie M Vida whose telephone number is (703) 306-4220. The examiner can normally be reached on 8:30 am 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Hofsass can be reached on (703) 305-4717. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-6743 for regular communications and (703) 308-6743 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

MMV

MMV

January 27, 2003

KA Williams
Kimberly A. Williams
Primary Examiner
~~Technology Center 2700~~